Using Sonochemistry and Sonoelectrochemistry in the fabrication of nanomaterials: New Results.

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The lecture will be divided into two parts, the first will introduce new sonochemical results, while the second will be devoted to research in sonoelectrochemistry. All the results will be related to nanofabrication. Sonochemistry is used in the last few years in my laboratory for the deposition of a large variety of nanoparticles, on flat and curved surfaces. Among the surfaces we have coated ceramics (silica, titania, zirconia, and alumina), metals (stainless steel), textiles (cotton, polyester, nylon, and wool), polymers (PS, PC, PP, and PMMA), carbon, and glass with a large variety of nanomaterials. The best deposition conditions, in terms of the amount of the nanoparticle on the surface, are obtained when the nanoparticles are produced.

And simultaneously thrown onto the surface by the microjets created after the collapse of the bubble. However, even if you use sonochemistry for throwing the nanoparticles as stones at the surfaces some of the nanomaterials will be adhered to the surface.

The mode by which we operate the sonoelectrochemical experiments follows the style of Reisse et al. This construction is directed towards the fabrication of nanomaterials in general and nanometals in particular. This device exposes only the flat circular area at the end of the sonic tip to the electrodeposition solution. The exposed area acts as both cathode and ultrasound emitter. A pulse of electric current produces a high density of fine metal nuclei. This is immediately followed by a burst of ultrasonic energy that removes the metal particles from the cathode. The lecture will present the results obtained when copper was deposited from an aqueous solution in the presence of surfactants such as CTAB (cetyltrimethyl ammonium bromide), PVA and PVP. The reason for using the above-mentioned surfactants in the preparation of the copper nanoparticles is avoiding agglomeration.

Finally, the major breakthrough obtained in these sonoelectrochemistry experiments is our success in fabricating Magnesium and Aluminum nanoparticles. We consider sonoelectrochemistry a unique method for the preparation of nanometals having a large negative reduction potential, for example Magnesium and Aluminium.

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